

DO NOT OPEN THIS TEST BOOKLET TILL YOU ARE ASKED TO DO SO

TR/DLTI/CHEM/P-II/17

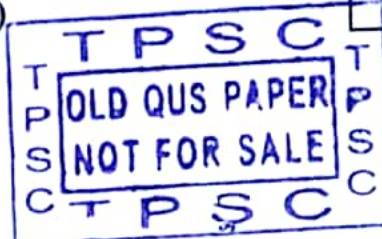
Test Booklet Series

TEST BOOKLET
GENERAL ABILITY TEST
(PART-II)
(Chemistry)

D

(Signature of the Candidate)

(Invigilator's Signature)



Time Allowed – 1 hour 30 minutes (One hour thirty minutes)

Maximum Marks – 60

I N S T R U C T I O N S

1. IMMEDIATELY AFTER THE COMMENCEMENT OF THE SCREENING TEST, YOU SHOULD CHECK THAT THIS TEST BOOKLET DOES NOT HAVE ANY UNPRINTED OR TORN OR MISSING PAGES OR ITEMS ETC. IF SO, GET IT REPLACED BY A COMPLETE TEST BOOKLET.
2. ENCODE CLEARLY THE TEST BOOKLET SERIES IN THE APPROPRIATE PLACE IN THE ANSWER SHEET BY BLACK BALL POINT PEN ONLY.
3. This Test Booklet contains 60 items (questions). Each question carrying 1 (one) mark only, has four responses (answers). You will select the response which you want to mark on the Answer Sheet. In case you feel that there is more than one correct response, mark the response which you consider the most appropriate. In any case, choose ONLY ONE response for each item.
4. You have to mark all your responses by **Black Ball Point Pen only** on the separate Answer Sheet provided. See directions in the Answer Sheet.
5. All items carry equal marks.
6. Before you proceed to mark in the Answer Sheet the responses to various items in the Test Booklet, you have to fill in some particulars in the Answer Sheet.
7. After you have completed filling in responses on the Answer Sheet and the Screening Test is completed, you should handover the Answer Sheet to the Invigilator only. You are permitted to take the Test Booklet with you.
8. Sheets for rough work are appended on the Test Booklet at the end.
9. **Penalty for wrong answers :**
 - (a) There will be four alternatives for the answer to every question. For each question for which a wrong answer has been given by the candidate, **one-third** of the marks assigned to that question will be deducted as penalty.
 - (b) If a candidate gives more than one answer, it will be treated as a **Wrong Answer** even if one of the given answers happens to be correct and there will be same penalty as above to that question.
 - (c) If a question is left blank, i.e. no answer is given by the candidate, there will be **no penalty** for that question.

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Four options are given against each of the following questions. Select the best/correct option from among the four options and encode in the answer sheet by using **Black Ball Point Pen** only as per example given below :

Example : The capital of India is

(A) Delhi

☒ New Delhi

(C) Indraprastha

(D) None of these

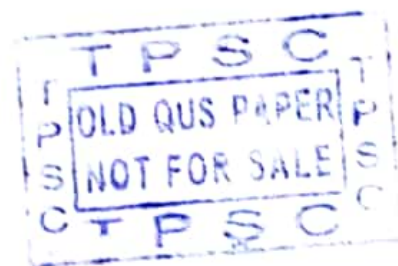
- The ratio of most probable velocity (C_m), average velocity (C_v) and root mean square velocity (C) is
 (A) $\sqrt{2} : \sqrt{\frac{8}{\pi}} : \sqrt{3}$
 (B) $1 : \sqrt{2} : \sqrt{3}$
 (C) $\sqrt{2} : \sqrt{3} : \sqrt{8}$
 (D) $1 : \sqrt{8\pi} : \sqrt{3}$
- At relatively high pressure, van der Waals' equation reduces to
 (A) $PV = RT$
 (B) $PV = RT - \frac{a}{V}$
 (C) $PV = RT + Pb$
 (D) $PV = RT - \frac{a}{V^2}$
- The kinetic energy of two moles of N_2 at 27°C is ($R = 8.324 \text{ JK}^{-1} \text{ mol}^{-1}$)
 (A) 5491.6 J
 (B) 6491.6 J
 (C) 7491.6 J
 (D) 8882.4 J
- When the temperature is increased, surface tension of water
 (A) increases
 (B) decreases
 (C) remains constant
 (D) shows irregular behaviour
- Heat liberated when 100ml of 1N NaOH is neutralised by 300ml of 1N HCl
 (A) 21.92 kJ
 (B) 17.19 kJ
 (C) 11.46 kJ
 (D) 5.73 kJ
- For the reaction

$$A(s) + 3B(g) \longrightarrow 4C(s) + D(l)$$
 ΔH and ΔU are related as
 (A) $\Delta H = \Delta U$
 (B) $\Delta H = \Delta U + 3RT$
 (C) $\Delta H = \Delta U + RT$
 (D) $\Delta H = \Delta U - 3RT$



7. A heat engine working between the temperature 727°C and 27°C will have the maximum efficiency
- 50%
 - 70%
 - 80%
 - None of the above
8. 75% of a first order reaction was completed in 32 minutes. When was 50% of the reaction completed?
- 16 minutes
 - 24 minutes
 - 8 minutes
 - 4 minutes
9. In case of auto catalysis
- reactant catalyses
 - heat produced in the reaction catalyses
 - product catalyses
 - solvent catalyses
10. K_1 and K_2 are equilibrium constant for reactions (1) and (2)
- $$\text{N}_2(\text{g}) + \text{O}_2(\text{g}) \rightleftharpoons 2\text{NO}(\text{g})$$
- $$\text{NO}(\text{g}) \rightleftharpoons \frac{1}{2}\text{N}_2(\text{g}) + \frac{1}{2}\text{O}_2(\text{g})$$
- Then
- $K_1 = \left(\frac{1}{k_2}\right)^2$
 - $K_1 = k_2^2$
 - $K_1 = \frac{1}{k_2}$
 - $K_1 = (k_2)^0$
11. Distribution law can not be applied for the system in which I_2 is distributed between
- H_2O and CS_2
 - H_2O and CCl_4
 - H_2O and ether
 - H_2O and alcohol
12. Two bottles of A and B contain 1M and 1m aqueous solution of sulphuric acid respectively
- A is more concentrated than B
 - B is more concentrated than A
 - Concentration of A = concentration of B
 - It is not possible to compare the concentration
13. Which one of the following pairs of solution can we expect to be ionic at the same temperature?
- 0.1M urea and 0.1M NaCl
 - 0.1M urea and 0.2M MgCl_2
 - 0.1M NaCl and 0.1M Na_2SO_4
 - 0.1M $\text{Ca}(\text{NO}_3)_2$ and 0.1M Na_2SO_4
14. If the observed and theoretical molecular mass of NaCl is found to be 31.80 and 58.50, then the degree of dissociation of NaCl is
- 83.96%
 - 8.39%
 - 90%
 - 100%

15. For which of the following electrolyte the value of Λ_m and Λ_{eq} are same ?
- (A) Na_2SO_4
 (B) BaCl_2
 (C) KCl
 (D) $\text{Al}_2(\text{SO}_4)_3$
16. When 20 ml $\left(\frac{M}{20}\right)$ NaOH is added to 10 ml $\left(\frac{M}{10}\right)$ HCl , the resulting solution has pH
- (A) < 7
 (B) $= 7$
 (C) > 7
 (D) $= 2$
17. Buffer solution can be obtained by mixing aqueous solutions of
- (A) CH_3COONa and excess HCl
 (B) CH_3COONa and CH_3COOH
 (C) NaOH and HCl
 (D) CH_3COOH and excess NaOH
18. Which of the following salts when dissolved in water hydrolyse
- (A) NaCl
 (B) MH_4Cl
 (C) KCl
 (D) Na_2SO_4
19. The solubility of AgCl is $4.0 \times 10^{-10} \text{M}$ at 298K. The solubility of AgCl in 0.04M CaCl_2 will be
- (A) $2.0 \times 10^{-5} \text{M}$
 (B) $1.0 \times 10^{-4} \text{M}$
 (C) $5.0 \times 10^{-9} \text{M}$
 (D) $2.2 \times 10^{-4} \text{M}$
20. What is the potential for the cell $\text{Cr} / \text{Cr}^{3+} (0.1 \text{M}) || \text{Fe}^{2+} (0.01 \text{M}) | \text{Fe}$
 $E^\circ \text{Cr}^{3+} / \text{Cr} = -0.74 \text{V}$
 $E^\circ \text{Fe}^{2+} / \text{Fe} = -0.44 \text{V}$
- (A) $+0.2606 \text{V}$
 (B) $+0.5212 \text{V}$
 (C) $+0.1303 \text{V}$
 (D) -0.2606V
21. Angular momentum of an electron in the n th orbit of hydrogen atom is given by
- (A) $\frac{2\pi}{nh}$
 (B) $\frac{2\pi}{2nh}$
 (C) $\frac{nh}{2\pi}$
 (D) nh



22. The energy of second Bohr orbit of hydrogen atom is -328 kJ mol^{-1} hence the energy of the fourth Bohr orbit would be

- (A) -41 kJ mol^{-1}
- (B) $-1312 \text{ kJ mol}^{-1}$
- (C) -164 kJ mol^{-1}
- (D) -82 kJ mol^{-1}

23. When ${}_{17}\text{Cl}^{35}$ undergoes (n, p) reaction, the radioisotope formed is

- (A) ${}_{15}\text{P}^{32}$
- (B) ${}_{16}\text{S}^{35}$
- (C) ${}_{16}\text{S}^{34}$
- (D) ${}_{15}\text{P}^{34}$

24. A radioactive element has $t_{1/2}$ of 60 minutes. The amount remaining after 3 hours is

- (A) 17.5%
- (B) 12.5%
- (C) 25%
- (D) 50%

25. The structure of ICl_2^-

- (A) Trigonal
- (B) Trigonal bipyramidal
- (C) Octahedral
- (D) Square planar

26. Maximum number of hydrogen bonds in water are

- (A) 4
- (B) 3
- (C) 2
- (D) 8

27. The planar complexes (MABCD) gives

- (A) Two optical isomers
- (B) Two geometrical isomers
- (C) Three optical isomers
- (D) Three geometrical isomers

28. K_3CoF_6 is a high spin complex. What is the hybrid state of Co atom in this complex ?

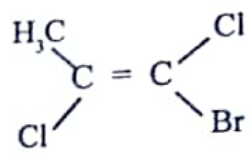
- (A) $\text{SP}^3 \text{d}$
- (B) $\text{SP}^3 \text{d}^2$
- (C) $\text{d}^2 \text{SP}^3$
- (D) dSP^2

29. The correct order of ionic radii for the ions S^{2-} , Cl^- , p^{3-} , Ca^{2+} is

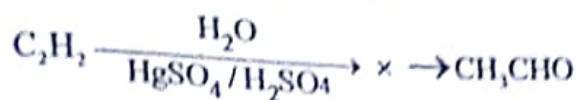
- (A) $\text{Ca}^{2+} > \text{Cl}^- > \text{S}^{2-} > \text{p}^{3-}$
- (B) $\text{S}^{2-} > \text{p}^{3-} > \text{Cl}^- > \text{Ca}^{2+}$
- (C) $\text{p}^{3-} < \text{S}^{2-} < \text{Cl}^- < \text{Ca}^{2+}$
- (D) $\text{Ca}^{2+} < \text{Cl}^- < \text{S}^{2-} < \text{p}^{3-}$

30. Which of the following oxide is most acidic ?
 (A) Na_2O
 (B) Al_2O_3
 (C) P_2O_5
 (D) SO_3
31. Which of the following is a soft base ?
 (A) CH_3COO^-
 (B) H^-
 (C) NO_3^-
 (D) CO_3^{2-}
32. For the redox reaction,
 $\text{MnO}_4^- + \text{C}_2\text{O}_4^{2-} + \text{H}^+ \longrightarrow \text{Mn}^{2+} + \text{CO}_2 + \text{H}_2\text{O}$
 correct stoichiometric coefficients of MnO_4^- , $\text{C}_2\text{O}_4^{2-}$, H^+ are
 (A) 2, 5, 16
 (B) 16, 5, 2
 (C) 5, 16, 2
 (D) 2, 16, 5
33. Alkali metals impart colour to Bunsen flame due to
 (A) low ionization energy
 (B) low melting point
 (C) their softness
 (D) the presence of one electron in the outermost shell
34. The sulphates of which metal given below has highest solubility in water ?
 (A) Ca
 (B) Ba
 (C) Sr
 (D) Mg
35. The ions having highest ionic mobility in aqueous solution is
 (A) Ba^{2+}
 (B) Mg^{2+}
 (C) Ca^{2+}
 (D) Be^{2+}
36. In presence of polyhydroxy organic compound like mannitol, boric acid act as
 (A) a stronger acid
 (B) a weaker acid
 (C) an amphoteric compound
 (D) a neutral compound
37. The stability of +2 oxidation state of Pb can be explained on the basis of
 (A) electronic configuration
 (B) inert pair effect
 (C) resonance
 (D) small size of Pb^{2+} ion



38. The basic character of hydrides of the 15 group elements decreases in the order
- (A) $\text{SbH}_3 > \text{PH}_3 > \text{AsH}_3 > \text{NH}_3$
 (B) $\text{NH}_3 > \text{SbH}_3 > \text{PH}_3 > \text{AsH}_3$
 (C) $\text{NH}_3 > \text{PH}_3 > \text{AsH}_3 > \text{SbH}_3$
 (D) $\text{SbH}_3 > \text{AsH}_3 > \text{PH}_3 > \text{NH}_3$
39. The boiling points of hydrides of group 16 are in the order
- (A) $\text{H}_2\text{O} > \text{H}_2\text{Te} > \text{H}_2\text{S} > \text{H}_2\text{Se}$
 (B) $\text{H}_2\text{O} > \text{H}_2\text{S} > \text{H}_2\text{Se} > \text{H}_2\text{Te}$
 (C) $\text{H}_2\text{O} > \text{H}_2\text{Te} > \text{H}_2\text{Se} > \text{H}_2\text{S}$
 (D) $\text{H}_2\text{O} > \text{H}_2\text{Se} > \text{H}_2\text{S} > \text{H}_2\text{Te}$
40. Which of the following interhalogens can not exist ?
- (A) BrF_5
 (B) FCl_3
 (C) IF_5
 (D) ICl_3
41. Ammonium ion is
- (A) nucleophile
 (B) electrophile
 (C) free radical
 (D) None of these
42. Which of the following is least stable carbonium ion ?
- (A) CH_3^+
 (B) $\text{CH}_3 - \text{CH}^+ - \text{CH}_3$
 (C) CH_3CH_2^+
 (D) $\text{CH}_3 - \overset{+}{\underset{\text{CH}_3}{\text{C}}} - \text{CH}_3$
43. The compound
- 
- (A) transform
 (B) Z isomer
 (C) Both (A) and (C) are correct
 (D) Neither (A) nor (B) is correct
44. Addition of HBr to 1, 3-butadiene above 40°C gives mainly
- (A) 3-bromo-1-butene
 (B) 1-bromo-2-butene
 (C) 2-bromo-1-butene
 (D) None of these

45. In the following reaction



What is \times ? 60°C

- (A) $\text{CH}_3\text{CH}_2\text{OH}$
- (B) $\text{CH}_3 - \text{O} - \text{CH}_3$
- (C) $\text{CH}_3\text{CH}_2\text{CHO}$
- (D) $\text{CH}_2 = \text{CHOH}$

46. Which one of the following primary alkyl bromide give nucleophilic substitution by SN^1 mechanism ?

- (A) $(\text{CH}_3)_3\text{C} - \text{CH}_2\text{Br}$
- (B) $\text{CH}_3\text{CH}_2\text{Br}$
- (C) CH_3Br
- (D) $\text{CH}_3\text{CH}_2\text{CH}_2\text{Br}$

47. Active methylene compounds react with aldehyde in presence of pyridine to give α, β unsaturated acids. This reaction is known as

- (A) Perkin reaction
- (B) Reformatsky reaction
- (C) Knoevenagel reaction
- (D) Claisen reaction

48. Grignard reagent reacts with ketone followed by acid hydrolysis to give

- (A) Primary alcohol
- (B) Secondary alcohol
- (C) Tert. alcohol
- (D) None of these

49. In aqueous solution, the basic strength of amines decrease in the order

- (A) $\text{CH}_3\text{NH}_2 > (\text{CH}_3)_2\text{NH} > (\text{CH}_3)_3\text{N}$
- (B) $(\text{CH}_3)_2\text{NH} > (\text{CH}_3)_3\text{N} > \text{CH}_3\text{NH}_2$
- (C) $(\text{CH}_3)_3\text{N} > (\text{CH}_3)_2\text{NH} > \text{CH}_3\text{NH}_2$
- (D) $(\text{CH}_3)_2\text{NH} > \text{CH}_3\text{NH}_2 > (\text{CH}_3)_3\text{N}$

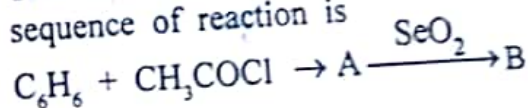
50. Conversion of phenol into salicylaldehyde proceeds through a reactive species (electrophile) called —

- (A) Carbanion
- (B) Carbocation
- (C) Carbene
- (D) None of these

51. Perkin reaction involves the addition of acid anhydrides to which type of aldehydes in presence of the sodium salts of the acids from which the anhydride is derived ?

- (A) Aliphatic
- (B) Aromatic
- (C) Alicyclic
- (D) None of these

52. The end product in the following sequence of reaction is



- (A) Benzoic acid
- (B) Phenyl glyoxal
- (C) Phenyl acetate
- (D) None of these

[Turn over

53. The least energetic conformation of cyclohexane is
- Boat form
 - Half chair form
 - Chair form
 - Twisted form
54. Epimer differ in configuration at
- C - 1 carbon
 - C - 2 carbon
 - C - 3 carbon
 - None of these
55. Which one of the following disaccharide on hydrolysis gives only glucose units
- Maltose
 - Sucrose
 - Lactose
 - None of these
56. Isoelectric point is the pH at which a protein or an amino acid has
- Dipolar ion
 - Cation
 - Anion
 - None of these
57. Nucleoside is composed of
- Purine or Pyrimidine base + Pentose
 - Purine / Pyrimidine base + Pentose + Phosphoric acid
 - Purine or Pyrimidine base + Hexose
 - Purine base + Hexose + Phosphoric acid
58. Which one of the following base is not present in RNA ?
- Adenine
 - Thymine
 - Uracil
 - Cytosine
59. Which one among the following is most basic ?
- Aniline
 - Pyrrole
 - Pyridine
 - Pyperidine
60. Naphthalene when treated with acetyl chloride in nitrobenzene in presence of $AlCl_3$ gives mainly
- α - Acetonaphthalene
 - β - Acetonaphthalene
 - Mixture of both
 - None of these

(Space for rough work)



13/TR/DLTI/CHEM/P-II/17/D-150

(11)

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